

PRE-SERVICE EDUCATION STUDENTS EVALUATING THE TTF MATHEMATICS PACKAGES

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Abstract

As part of the Teaching Teachers for the Future (TTF) project packages were developed using ICT within the mathematics content area. The rationale for these packages included using digital technologies to teach mathematical content and how student's mathematical understanding can be developed and skills improved through the use of ICT (Teaching Teachers for the Future, 2011b). At The University of Queensland the TTF project focused on both mathematics and science. Part of the project involved third year primary education students enrolled in a mathematics education course with one task involving the students evaluating these packages. There were 53 students who evaluated the packages for either early years of schooling or upper primary years of schooling with students being asked spend time out of class going through the package and then writing a 200 word summary of how they might use it in the classroom and the best aspects of the package. This paper discusses the results of these evaluations and how they can be used further with pre-service teachers. It focuses on the positives of the packages as well as how they help pre-service education student's conceptualise how technology can be used to enhance classroom teaching.

Introduction

After reading the Early Years package, I have gained new knowledge and lessons to implement in my future classroom. I was not aware that using technology to facilitate student exploration of number sequences was a successful strategy to teach number. I can see this turning mathematics around into something fun and something that can be explored in many different ways, rather than the traditional rote learning and somewhat boring style of mathematics. I will use the knowledge and applications from this package when doing mathematical inquiry in my classroom. (3rd year primary education student)

The quote above, from a student studying primary education, sums up the new *Teaching Teachers for the Future* (TTF) project mathematics education packages that were developed in 2011. The TTF project is a \$7.8 million, national Australian Department of Education, Employment and Workplace Relations (DEEWR) funded project that is part of the Australian government's 'Digital Education Revolution' initiative. This project aimed to "embed ICT into everyday classroom learning by transforming the delivery of teacher education" (Department of Education Employment and Workplace Relations, 2010). The project used the idea that teachers who are expert at teaching ICT will assist universities to transform their teaching courses to include more ICT that improves pre-service teachers' technological knowledge and thereby empowering the next generation of school teachers with the necessary skills to make ICT integral to their classroom pedagogy.

The project, based on the Technological Pedagogical Content Knowledge (TPACK) framework initially developed by Mishra and Koehler (2006), begins with the notion of knowledge integration around technology that has been formalised into the construct of TPACK, which refers to the areas of integration of technological pedagogical and content knowledge (Mishra & Koehler, 2006; Thompson & Mishra, 2007). The importance of TPACK is that it makes pre-eminent the integration of a teacher's knowledge, rather than simply its possession (Kelly, 2010). The TTF Project began in January 2011 and concludes in May 2012 with all 39 universities involved in teacher education in Australia being included. It focuses on the first four curriculum areas that have been developed as part

of the new Australian curriculum - mathematics, English, science and history as previously in Australia each state was responsible for its own curriculum.

The Teaching Teachers for the Future (TTF) Project had three main components which included:

- Component One: a trial led by Australian Institute for Teaching and School Leadership (AITSL) where explicit ICT statements were developed and trialled.
- Component Two: was led by Education Services Australia (ESA) and developed a national collection of digital resources.
- Component Three: provided all institutions providing teacher education to employ ICT Pedagogy Officers and Project Coordinators to work with both teacher educators and pre-service teachers to develop exemplary ICT curriculum and pedagogy. This was to focus on two of the four Australian curriculum areas. (Department of Education Employment and Workplace Relations, 2011).

This paper focuses on Component Two and investigates how pre-service teachers reacted to two of the mathematics packages that were developed. Although pre-service teachers have trialled the packages and have been interviewed about them, there is currently no research on a course of students interrogating the packages. There are videos from these teachers who have trialled the packages located on the Pre-Service Teachers Talk website (Teaching Teachers for the Future, 2011c).

Methodology

Approximately, 60 students were enrolled in a 3rd year primary education course that was about mathematics education. This was their third and final course on mathematics education in their four year primary teaching degree. As part of the Teaching Teachers for the Future project students in the course received a well-integrated and systematic approach to the integration of ICT in the course.

Students were asked to evaluate the TTF project packages as homework for part of the course with a specific task required of them. The task required the students to investigate either the early years or middle years of schooling package and then write a 200 words summary of how it might be used in the classroom. The students were also required to outline the best aspects of the package. From the class there were 53 students who completed the non-assessable task.

Results

The mathematics packages focused on how teaching mathematical content can be enhanced by the integration of digital technologies. The website states those that look at the maths packages will gain an understanding of how to organise a classroom, use specific educational technologies as well as see a range of teaching strategies and classroom management ideas (Teaching Teachers for the Future, 2011b).

The early years of schooling package is described as being about “teaching number sequences and counting to support the development of number sense and computation strategies in the early years” (Teaching Teachers for the Future, 2011b, p. 1). The middle years of schooling package is “about teaching the relationship between common fractions and percentages to middle-years students and connecting to real contexts through technology to develop proportional reasoning” (Teaching Teachers for the Future, 2011b, p. 1).

Overall, students were very positive about both the early years and the middle year’s packages. Student comments include one student stating “the resource teaches how to teach effectively with ICTs and I find the content quite relevant to today’s modern world”. Two other students recorded:

I found the whole package a treasure. As a student who is not very effective with technology, this resource provides umpteen amounts of advice and methods on how to

implementing a variety of different technologies into all lessons in the classroom. Overall I thoroughly enjoyed going through the package and, know it will be a constant resource in my further occupation as a teacher of primary years.

Overall it is an in-depth package that covers all important aspects of teaching any concept, pedagogy, curriculum, professional learning and resources. As well it is an easy to navigate website that is engaging and interactive with tools such as videos, hyper-links and documents.

There were 17 students who reported the connection of the packages to the new Australian curriculum (the State of Queensland is currently implementing this in schools so pre-service teachers are very aware of the new curriculum). One student commented “the package provides clear links to the Australian Mathematics Curriculum, not only in the knowledge that needs to be covered, but also to the proficiencies”; while another stated “the direct benefits it has to the Australian Curriculum make[s] it a realistic and useable resource to use. It shows clear links to the new curriculum and good information”.

The packages also identify key questions and lesson objectives with seven students commenting on this. The packages provide content knowledge and digital literacy achievement strands for the year level and effectively introduces relevant teaching strands. One student commented:

There are numerous aspects of the package that make it a really good resource for teachers. Firstly it explains which teaching standards are relevant to the program, which we as teachers must demonstrate that we are addressing in our personal development.

Twenty five students made comment on the curriculum enriched, detailed, real life, efficient, well-structured and practical lesson plans. It was commented, “it helps knowing how to implement a maths lesson correctly and to see it sequence right to build students higher order thinking skills”.

Several students commented that the packages help to increase ICT use and they model the embedding of ICT practices. One student commented, “the pack is a great way to integrate ICTs in the classroom therefore meeting the requirements of the curriculum. ICTs are a great tool to engage and motivate students” while another reported “the various information on media use - video, audio, interactive objects, digital cameras, projects in media aspects and digital recording into lessons was good and the discussion by the teacher under Teacher Voice pulled this together”. This shows that the use of video is a positive aspect of the packages and assists the students with the excellent visual reinforcement that it provides.

The packages modelled lessons that engaged and motivated students to participate. This was evident within the writing of several students with nine commenting on this. Student comments included:

It is evident that technologies are a vital part to the classroom learning environment. It gets students well engaged and learning about the world around them in a collaborative student-centred environment.

What was inspiring to see was how genuinely engaged the students were with the technology, and equally how well the technology enhanced the learning experience. By incorporating the use of flip-cameras and the laptops as well as the IWB, the students had a lot of control over the lesson, and were therefore active participants.

Five students made comment to the fact the packages provide pedagogical tips for using ICT. This suggests the packages are well developed with one student commenting on the ICT resources by stating:

One of the best aspects of the package is its access to resources. The package provides specific state based ICT Resources that are aimed at. Another great aspect of the package is that it provides video examples of parts of the lesson.

Other aspects of the analysis of the student reports are included in Table 1. It should be noted that the students were asked to comment on the positive aspects of the packages. Comments are far ranging and very positive, with many students making numerous comments on various aspects of the packages.

Table 1

Positive Aspects of the Mathematics Packages

Students have a good understanding of TPACK from looking at the packages.
The lesson plans are useful templates.
The packages provide ideas for teaching and developing lesson plans.
Lessons can be modified to suit individual needs.
Lesson plans are sequential.
The lesson plans encourage students to investigate, create and communicate, and operate with ICT.
Facilitates an engaging and investigative approach to teaching.
Help develop teachers' ICT capabilities.
Makes teachers comfortable to utilise ICT effectively in class.
Enables teachers to implement engaging and interactive lessons.
Useful even for teachers with less ICT knowledge.
Videos demonstrate how to incorporate ICT in mathematics teaching and give ideas on incorporation of ICT.
Videos allow students to see physical and practical applications to lesson plans.
Provides information on how to incorporate pedagogical content knowledge.
Provides practical strategies and pedagogical ideas and helps teachers improve pedagogical content knowledge.
Highlights professional learning through tutorials and external links.
Provides teaching strategies and classroom management ideas.
Links to a myriad of external resources and is great for time poor teachers.
Develops higher order thinking and understanding.

There were eighteen comments about the excellent links to the ACMA cyber safety website. Student comments include one student stating 'the package also deals with the more ethical issues of

technologies within schools including safe practice in regards to using the Internet, such as cyber bullying”, while another stated “the sections on cyber safety were very detailed, useful and necessary in any classroom where ICT is utilised. The hints, tips and additional links were way too vast for a cursory look”.

Although not a focus of the task, some students commented on the weaknesses of the mathematics. These include the need for a backup if the technology fails, and that the lesson plans were quite teacher directed as opposed to student centred. There were two comments on this with one student commenting “there definitely needs to be a balance between student and teacher directed, however, it is important to allow students the chance to build on their own knowledge and make discoveries”. Two students also commented on the lack of inquiry tasks. One student felt that the extra information contained in the package would be better suited as just a link and not actually written into the package. This student stated “I found the lessons on their own useful, and would use them as a whole in my future classrooms. However, all the extra information around them was irrelevant to me and just seemed to bog the whole package down”.

In conclusion, the packages are user friendly (N=13 comments) and they promote digital literacy for students and teachers (N=8 comments). One student commented “the user friendly information within the package, directed at teachers, makes this resource very practical and therefore valuable for educators in such a demanding and dynamic profession”.

Discussion and Conclusion

These packages were systematically developed as Component Two of the TTF project in order to allow pre-service teachers to be able to investigate and interrogate the packages while studying at university. The packages were placed on the TTF website for pre-service teachers across Australia to use under the guidance of their university lecturers. The website “contains a collection of national digital resources that provide pre-service teachers, teacher educators and teachers with rich professional learning ‘anywhere, anytime’ packages” (Teaching Teachers for the Future, 2011a).

On the TTF mathematics website it states the focus of the packages “is on how teaching mathematical content is enhanced by digital technologies, the rationale for using a technological approach and the ways in which this approach changes how students learn, their mathematical understanding develops and how skills are improved” (Teaching Teachers for the Future, 2011b). This paper has shown that the packages will have achieved their focus and as can be seen from the results of the student task the students have reported the many positive aspects of the packages and they are achieving the aim of the mathematics packages when viewing the early and middle years. The packages also place students well for meeting criteria with the graduate standards being introduced by AITSL.

Overall, these packages are well designed and developed. They demonstrate to students in a systematic way how ICT can be used in the mathematics classroom. Although some students commented that it would be nice to have examples in mathematics strands other than number, results from the students were overwhelmingly positive. Perhaps more packages can be developed by Education Services Australia in the future that focuses on strands other than number. The staff at The University of Queensland looks forward to using these packages in the future and in each of the curriculum areas they have been developed for.

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Author Details

Chris Campbell has extensive teaching experience across all levels of education. She began her teaching career in the Mount Druitt District in Western Sydney at Tregear Public School. She then went on to teach at schools in Wollongong and South Western Sydney while completing her doctorate part time. When working in the school system, Chris took an active role in technology in the schools she worked at and was often the computer coordinator as well as taking a leadership role in promoting staff professional development. Currently, Chris is a Lecturer in ICT Education at The University of Queensland where she teaches pre-service teacher education students, who are studying to become secondary teachers, to use ICT in their teaching. Chris was a lecturer at La Trobe University for four years where she taught ICT in Education to pre-service teachers (studying to be both primary and secondary teachers). Her research interests include integrating ICT as a tool and also include learning design and the use of iPods in secondary schools. She has also completed work on self-regulation and ICT in the classroom. In 2011, Chris worked on the Teaching Teachers for the Future (TTF) project as the ICTPO at The University of Queensland.

